A rejection of claims 1-10 under Section 112, second paragraph, as indefinite for failing to distinctly point out and particularly claim the invention, was affirmed by the Board in the Decision on Appeal. In light of the Board's comments, Applicant has amended independent claim 1 to eliminate the phrase "door type of." The Board identified support in the Specification for the current limitation. Claim 1 has been further amended to clarify a large opening for loading large objects.

Applicant has further added new claim 12 to include a limitation that all power sources and yaw control surfaces be at least as far forward as the larger lifting surface, which further distinguishes applicant's preferred designs from Rutan designs. Claim 12 now has three key elements. The first, in shorthand, is a "two-surface canard." The second element is "a large opening at the rear of the fuselage for loading large objects." The third element is "all power source and yaw control surfaces at least as far forward as the larger lifting surface."

The Examiner has been directed by the Board to make additional factual findings and conclusions of law as to whether claims 1-11 would have been obvious to one of ordinary skill in the art in view of Rutan ATTT and Rutan '800. In light of this emphasis on Rutan, Applicant submits a supplemental Information Disclosure Statement herein, to include in the record additional references, including other Burt Rutan aircraft models, such as the VariEze, the Long-EZ, the Quickie and the Defiant. Three further art references are submitted, as they appear related: the Dragonfly (which appears to be derived from the Quickie;) an article from the publication Model Airplane News, published in the United States in August 1931; and a copy of the 1984 book, Canard, a Revolution in Flight, recently acquired by applicant.

Observations

Re the ATTT

ATTT references mention aft loading. Clearly, however, the ATTT reference is not a "two surface canard," as per independent claims 1 and 11. The ATTT is a three surface canard (significantly different from a two surface canard) with rear, boom-based yaw control. The ATTT reference has a boom supported empennage with rear yaw control surfaces.

The Scaled Composite Reference of the Supplemental IDS evidences that, in the history of the development of the ATTT, the rear twin boom supported third lifting surface and yaw control were added to correct design deficiencies of the "cruciform tail" of the original ATTT design. Such disclosure teaches away from a two surface canard and a canard without an empennage. As stated on Rutan's Scaled Composites web site, "In an effort to improve the aft loading capability of the aircraft and to correct aerodynamic deficiencies discovered during the test program, the ATTT aircraft [cruciform tail design] was modified with a twin-boom tail..." Thus, as an initial response to any suggestion to modify the ATTT to a two-surface canard, and a canard without an empennage, the actual recorded history of the development of the ATTT teaches away from such a modification. The ATTT inventor disclosed specifically adopting a three horizontal lifting surface configuration, with a boom supported empennage rather than a standard empennage (cruciform tail.) Never was a two-surface canard disclosed as considered.

In summation, (1) the ATTT is not a true canard, if true canards are regarded as two surface canards. Rather, the ATTT is a three surface aircraft that is frequently discussed with true canards. (2) As indicated in the attached Scaled Composites Website text reference, submitted herewith, the ATTT had two designs, an original design with a cruciform tail configuration and a subsequent design with twin boom tail having a general configuration similar to that of a Rockwell Bronco. This ATTT aft loading aircraft never, apparently, considered a true canard design for its configuration. The "cruciform tail" was altered in favor of the "twin boom tail" during development in an effort to improve the loading capability and to correct aerodynamic deficiencies discovered with the cruciform tail. Never were rear yaw control elements relinquished.

Re the '800

The Rutan '800, as well as the attached references to the VariEze, Long-EZ, Defiant, Dragonfly, Quickie, the model book article and the canard book, all disclose a "two surface canard." None, however, teach the absence of an empennage or structure permitting the addition of a large rear cargo door. All teach an empennage comprising either, or both of, (1) a pusher engine, (2) a rear centered pusher engine pair; and/or (3) a yaw control surface or vertical stabilizer. None of the references teach structure

compatible with a large rear fuselage door. Rather all of the references teach structure incompatible with a large rear fuselage door, (e.g. either a power source or a vertical stabilizer in the rear, incompatible with a large rear fuselage door.)

Thus, while the Rutan '800 discloses a two-surface canard (as does the VariEze, the Long-EZ, the Defiant, the Quickie/Dragonfly, the old model plane article and the History of Canard book) none disclose structure compatible with a large opening in the rear of the fuselage. The Rutan '800 discloses twin-engine power units centered behind the fuselage, and in an alternate embodiment, single-engine power centered of the rear of the fuselage. The position of the centered engines prohibits a large opening in the rear of the fuselage. (Again, the VariEze, Defiant and Long-EZ all include a power source and/or vertical stabilizer immediately behind the fuselage, also rendering the designs incompatible with a large opening in the rear of the fuselage. The Quickie/Dragonfly and the model plane shown in Model Airplane News have empennages with rear centered vertical stabilizers and rudders.)

Motivation to Combine

In regard to motivation to combine features of the ATTT and '800 to reach applicant's invention (a two surface canard [without an empennage] and with a large rear cargo door,) the prior art teaches away. The prior art, in particular including the art submitted herewith, supports applicant's position that it was not taught or suggested as obvious, or a matter of mere design choice, to combine a two-surface or a true canard with a large rear fuselage door for cargo. The history of aircraft design indicates only one combination of a (three surface) canard with aft loading cargo, the ATTT, and it teaches a boom supported empennage with yaw control.

Further review of the history of canards shows that true canards, or two-surface canards, predominately teach and suggest rear centered power. (See below for a discussion of exceptions.) Rear centered power might include (1) a single pusher engine; (2) a rear centered pair; (3) or an axially lined pair. All three rear centered power options are incompatible with a large rear cargo door.

The known few exceptions to a true canard without rear centered power are the Quickie and Dragonfly and the model airplane article illustrating duck type Voke Wolf F 19A ente. All three of these designs teach a significant rear vertical stabilizer or yaw

control element. Thus, the few exceptions to a design for a two-surface canard without rear centered power all incorporate a rear vertical stabilizer or a yaw control element. (See below for suggestion why this is so.) A rear vertical stabilizer or yaw control element is also incompatible with a large rear cargo door.

One of ordinary skill in the art would further note that Burt Rutan, the inventor of the '800, when he developed the ATTT, a cargo oriented three surface canard which eliminated rear centered power, specifically taught rear vertical stabilizers or yaw control.

Teaching of Prior Art as a Whole

It is stated in *In re Gurley*, 27 F.3d 551,553 (Fed. Cir. 1994):

> A reference may be said to teach away when a person of ordinary skill upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant. The degree of teaching away will of course depend on the particular facts; in general, a reference will teach away if it suggests that the line of development flowing from the reference's disclosure is unlikely to be production of the result sought by the applicant.

Applicant submits that what is true of a "reference" is true for the "prior art as a whole." In the instant case the prior art as a whole, the history of the development of canards, teaches away from applicant's combination.

Why No Motivation to Combine

To summarize, two-surface canards almost exclusively teach rear centered power, in the form of a single pusher engine, axially aligned pusher and tractor engines, or a rear-centered pair, as mentioned above. All three designs are incompatible with a large rear-cargo door.

The known exceptions to true canards with rear centered power are the two previously mentioned experimental kit models, the one passenger, low-cost Quickie and Dragonfly, and the craft illustrated in the model airplane article of 1931, the Duck type Folk Wolf F 19A ente. However, they all replace rear power with a rear vertical stabilizer or rear yaw control, also inconsistent with a large rear cargo door.

Applicant submits that a key reason why this is so is that foregoing rear centered power, in a true canard, without rear centered yaw control, raises stability and control issues. Stability and control issues are raised by virtue of the fact that the thrust point, the horizontal control and the yaw control would all reside essentially at or on the same side of (longitudinally) the center of gravity. A "rear moment" is believed important, by one of ordinary skill in the art of aircraft design. Hence, a rear vertical stabilizer or yaw control is found on the empennage when rear centered power is foregone. (Test information taught applicant that this was not necessary.)

To go into more detail, one of ordinary skill would know that the point of thrust and its position in relation to the center of gravity affects control and stability, and in particular the lateral movement around an aircraft's vertical axis, referred to as yaw, as well as horizontal control and stability around the center of gravity. This is especially true in multi-engine aircraft, and influences design considerations. Even a conventional single-engine tractor propeller positioned on center-line in front of the aircraft's nose will produce a yawing moment as thrust is increased or decreased. This is due to torque effect of the rotating engine and a slip stream created down the fuselage by the prop wash. Conventional design teaches balancing yaw control, horizontal control and thrust control by placing them on opposite sides of the center of gravity longitudinally (i.e., front engine with rear rudder, canard surface with rear engine, etc.) thereby creating forward and rear moments. One of ordinary skill in the art, applicant submits, without the recourse to data, would not have a basis for a reasonable expectation of success with an aircraft design that places all three sources of moments approximately at or on the same side of the center of gravity.

Again, the history of (true) canard design abundantly teaches, discloses and supports the above asserted conventional wisdom of balancing a front horizontal surface with a rear control pusher engine or rear yaw control. Conventional wisdom teaches away from the instant design.

Secondary Considerations – Long Felt Need and Teaching Away by Prior Art

One of the ways in which a patent's subject matter can be proven obvious is by noting that there existed at the time of the invention a known problem for which there was an obvious solution encompassed by the patent's subject matter." *KSR Int'l Co v.*

Teleflex, Inc. However, the instant cargo-loading problem identified by Applicant was a "known problem" not only at the time of the present invention, but it had been known and had existed for over half a century, a long-felt need of personal air travel. In spite of the significant amount of literature and commercial pursuit that exists in the field of aircraft design, neither applicant nor the Examiner find applicant's particular combination to solve the problem discussed or considered anywhere during those decades. The previously known elements of (1) an aircraft for cargo having a large door at the rear of the fuselage and (2) a two-surface canard, both existed more than 50 years before being combined by applicant in the present invention.

The legal question arises as to whether any aircraft designer of ordinary skill would have found it obvious to modify the three-surface canard design of Rutan '800, by eliminating one lifting surface, specifically the rear one, and by removing the dual centered engines to add the aft cargo door of the Rutan ATTT. And this combination must resist adding the boom supported empennage of the ATTT, taught by Rutan to be important. In fact, Rutan, a significant authority in novel aircraft designs and in use of canards, taught away from this modification. One of ordinary skill is deemed to know of this teaching.

Respectfully Submitted,

3/9/5
Date

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